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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,595	07/17/2003	Hiroshi Sumi	Q76617	9293

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SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER

STEIN, STEPHEN J

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 02/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,595

Applicant(s)

SUMI ET AL.

Examiner

Stephen J Stein

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10/28/2003.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 9-13 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claims 9-13 recite the limitation "an inorganic matter having a size of 10 μm or less". This limitation makes the claims indefinite because the claim fails to recite which dimensional characteristic of the "inorganic matter" has the claimed size. e.g. height, width, length, particle size, particle diameter, etc.

4. Claim 18 is indefinite for failing to further limit its base claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by US 4,789,411 (Eguchi et al.).

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Eguchi et al. teaches a conductive copper paste for use in a circuit board and electronic through holes (via holes) comprising a copper powder (inorganic material) of a particle diameter of 1 to 30 μ m (abstract and col. 2, lines 15-30).

7. Claims 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,287,620 (Suzuki et al.).

Susuki teaches a method of producing a circuit board with via contacts by filling through holes (via holes) from the surface of the green sheet with a conductor paste comprising copper powder and a ceramic powder having a particle size from 0.1 to 1 μ m (10-100 nm). Susuki further teaches that that a conductor paste (plating layer) is formed on the green sheet over the through holes (via holes) and further teaches that semiconductor integrated circuits are joined to the circuit board on the via contacts. It is examiner's position that the copper filled through wholes will function both electrically conducting vias and as a thermal conducting vias.

8. Claims 9, 10, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 04081922A (Yoshiyuki).

Yoshiyuki teaches a copper conductor paste used in via holes in ceramic multilayer substrates comprising copper powder and a refractory filler such as alumina, zirconia, zircon or silica having a particles size of 0.2 – 5.0 microns and an organic binder (see paragraphs 0008 – 0013 of translation). It is examiner's position that the copper filled through wholes will function both electrically conducting vias and as a thermal conducting vias.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 15-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Susuki.

As stated above, Susuki teaches a method of producing a circuit board with via contacts by filling through holes (via holes) from the surface of the green sheet with a conductor paste comprising copper powder and a ceramic powder having a particle size from 0.1 to 1 μm (10-100 nm).

Although Susuki fails to teach or suggest the claimed cross sectional area of the of the wiring board (circuit board) having the claimed particle size percentage or the viscosity of the copper powder, absent a showing of criticality with respect the claimed particle size percentage and viscosity (both result effective variables), it would have been obvious to adjust the particle size of the ceramic and viscosity of the copper powder in order to achieve filling density of the via holes. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

11. Claims 1, 2, 4, 5, 8-10, 13, 14 and 18-21 are rejected under 35 U.S.C. 102(b) as being obvious over JP 05081922A (Yoshiyuki).

As stated above, Yoshiyuki teaches a copper conductor paste used in via holes in ceramic multilayer wiring board substrates comprising a copper powder and a refractory filler such alumina, zirconia, zircon or silica having a particles size of 0.2 – 5.0 microns and an organic binder.

Although Yoshiyuki fails to teach the claimed ratio of parts by mass of organic vehicle to the parts by mass of the copper powder, absent a showing of criticality it would have been obvious to optimize the ratio of organic vehicle (a result effective variable) through ordinary experimentation in order to achieve a desired viscosity. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Regarding dependent claim 14, it is noted the reference does not disclose that the copper via conductor contains any elemental Fe, therefore, it is the examiner's position that the via conductor will comprise less than 5.0 parts by mass of Fe element per 100 parts by mass of the copper element.

12. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshiyuki as applied to claim 1 above, and further in view of US 6,489,014 (Tomiyama et al).

Yoshiyuki fails to disclose that the ceramic multilayer wiring board with the via conductor on the surface has a plating layer on the exposed face of the via conductor and further fails to teach that a semiconductor element is mounted on the wiring board and a terminal of the semiconductor element is connected via the conductor through the joining member.

Tomiyama teaches a wiring board with conductive layers and plating layers covering the conductive layers and further teaches that the plating layer, which covers each of the conductive layers, is formed in order to achieve excellent bonding property at the time when an external

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electric circuit such as a semiconductor element and a flexible wiring board is bonded to the conductive layer as well as to prevent the conductive layer from corrosion (col. 1, lines 44-63).

Therefore, it would have been obvious to a person of ordinary skill at the time of the invention to apply a semiconductor element to the wiring board of Yoshiyuki with a plating layer on the via conductors, because it would provide a desired electrical function to the wiring board and allow for excellent bonding of the semiconductor element while preventing corrosion to the conductive layer.

13. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,336,444 (Casey et al.).

Casey teaches a copper paste composition used in vias in multilayer ceramic substrates comprising copper powder, Fe_2O_3 and an organic medium (vehicle) (col. 6 and col.8).

Although Casey fails to teach the claimed ratio of parts by mass of organic vehicle to the parts by mass of the copper powder, absent a showing of criticality it would have been obvious to optimize the ratio of organic vehicle (a result effective variable) through ordinary experimentation in order to achieve a desired viscosity. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Stein whose telephone number is 572-272-1544. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:00 p.m. If the

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attempts to reach the examiner are unsuccessful, the examiner's supervisor, Deborah Jones can be reached by dialing 572-272-1535.

January 25, 2004

A handwritten signature in cursive script, appearing to read "Stephen J. Stein".

Stephen J. Stein
Primary Examiner
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